ENVIRONMENTAL ASSESSMENT

USDA Forest Service

Confluence Meadow Restoration Project

Eagle Lake Ranger District, Lassen National Forest

Lassen County, California

Introduction

The Eagle Lake Ranger District (ELRD) of the Lassen National Forest (LNF) is proposing the Confluence Meadow Restoration project (hereafter Confluence project). The Confluence project area encompasses approximately 200 acres of National Forest System lands administered by the ELRD of the LNF. The proposal stems from an assessment of meadow and stream conditions along Pine Creek from its headwaters to Eagle Lake in 2015. This assessment is one of many projects in the Pine Creek watershed that were planned and carried out by the US Forest Service and multiple partners as part of the Pine Creek Coordinated Resource Management Planning (CRMP) Group. The CRMP formed in 1987 to coordinate efforts to improve hydrologic conditions in Pine Creek, restore the stream/riparian ecosystem, and to restore a natural Eagle Lake rainbow trout (ELRT) fishery in Pine Creek (Pustejovsky 2007).

Pine Creek is the major tributary to Eagle Lake and is located in several priority watersheds identified in 2011 under the US Forest Service's Watershed Condition Framework. Pine Creek is approximately 35 miles long with continuous flows from the headwaters to Eagle Lake during the spring runoff when snow is melting. Only seven miles of the spring-fed upper reaches are perennial; the remainder of the creek is intermittent and flows from the spring thaw through early or mid-June during normal precipitation years. The amount and duration of flow is dependent on the size of the snowpack, creating highly variable stream flows from year to year.

Erosion rates and sedimentation are limited within the watershed; this is due to several factors, including surface flows that are primarily from snowmelt rather than concentrated rain events, low landscape relief, and volcanic soils with high infiltration rates (Young 1989). Most sediment transport in the creek is derived from local bed and bank erosion. In many cases, including Confluence Meadow, the entrenched stream is actively eroding laterally, and in some instances vertically, and banks regularly slough off during significant flow events.

Pine Creek is particularly important because it is the primary spawning tributary for the Eagle Lake Rainbow Trout (ELRT) Oncorhynchus mykiss aquilarum, a subspecies of rainbow trout endemic to the

Eagle Lake watershed. There has been an increased emphasis on restoration of Pine Creek and creation of conditions to support natural spawning of ELRT. Natural spawning of ELRT occurs during the spring runoff period (late February to early May, when Pine Creek is connected to Eagle Lake.

The proposed action is designed to be consistent with the 1992 *Lassen National Forest Land and Resource Management Plan* (LRMP) and 1993 *Record of Decision* (ROD) as amended by the *Sierra Nevada Forest Plan Amendment* (SNFPA) FSEIS and ROD (2004), and the *SNFP Management Indicator Species Amendment* (2007), sections 401 and 404 of the Clean Water Act, and other relevant Federal and State laws and regulations.

The Confluence project would be implemented under the pre-decisional objection process found at 36 CFR 218. Under this collaborative process, public concerns can be addressed before a decision is made increasing the likelihood of resolving any concerns and making better, more informed decisions.

Project Area

The project area is roughly 24 air miles northwest of Susanville, Lassen County, California, just east and southeast of the Blacks Mountain Experimental Forest. Included are portions of Township (T) 32 North (N), Range (R) 9 East (E), Sections (S) 4-5; T33N, R9E, S33 of the Mount Diablo Meridian (Figure 1).

The project occurs in the southwestern portion of a meadow system where Pine Creek and Little Harvey Creek join referred to as Confluence Meadow. The portion of Pine Creek flowing through Confluence meadow would primarily be used as a migration corridor for ELRT. Project work would occur over approximately 200 acres total in the 5th field Middle Pine Creek Valley watershed and Squaw Valley-Pine Creek 6th field subwatershed[1] within the Harvey (MA 12) Management Area, as identified in the 1992 LNF Land Resource Management Plan (LRMP).

In most meadows along Pine Creek, including Confluence Meadow, different plant assemblages are distributed across a hydrologic gradient as a function of flooding frequency, duration, and depth to groundwater. Wet meadow and riparian vegetation is typically confined to active stream channels and is characterized by grass and grass-like plants such as *Juncus balticus* and *Carex nebrascensis*. Mesic vegetation is located on inset flat areas higher in elevation with seasonal flooding. These species include *Deschampsia cespitosa*, *Muhlenbergia filiformis*, and *Carex athrostachya*. Rarely-flooded valley flats adjacent to the stream channels are dominated by sagebrush (*Artemisia tridentata, A. arbuscula, A. cana*), often with an understory dominated by shorthair sedge (*Carex filifolia*).

[1] US Geological Survey Watershed Boundary Dataset, 2012.

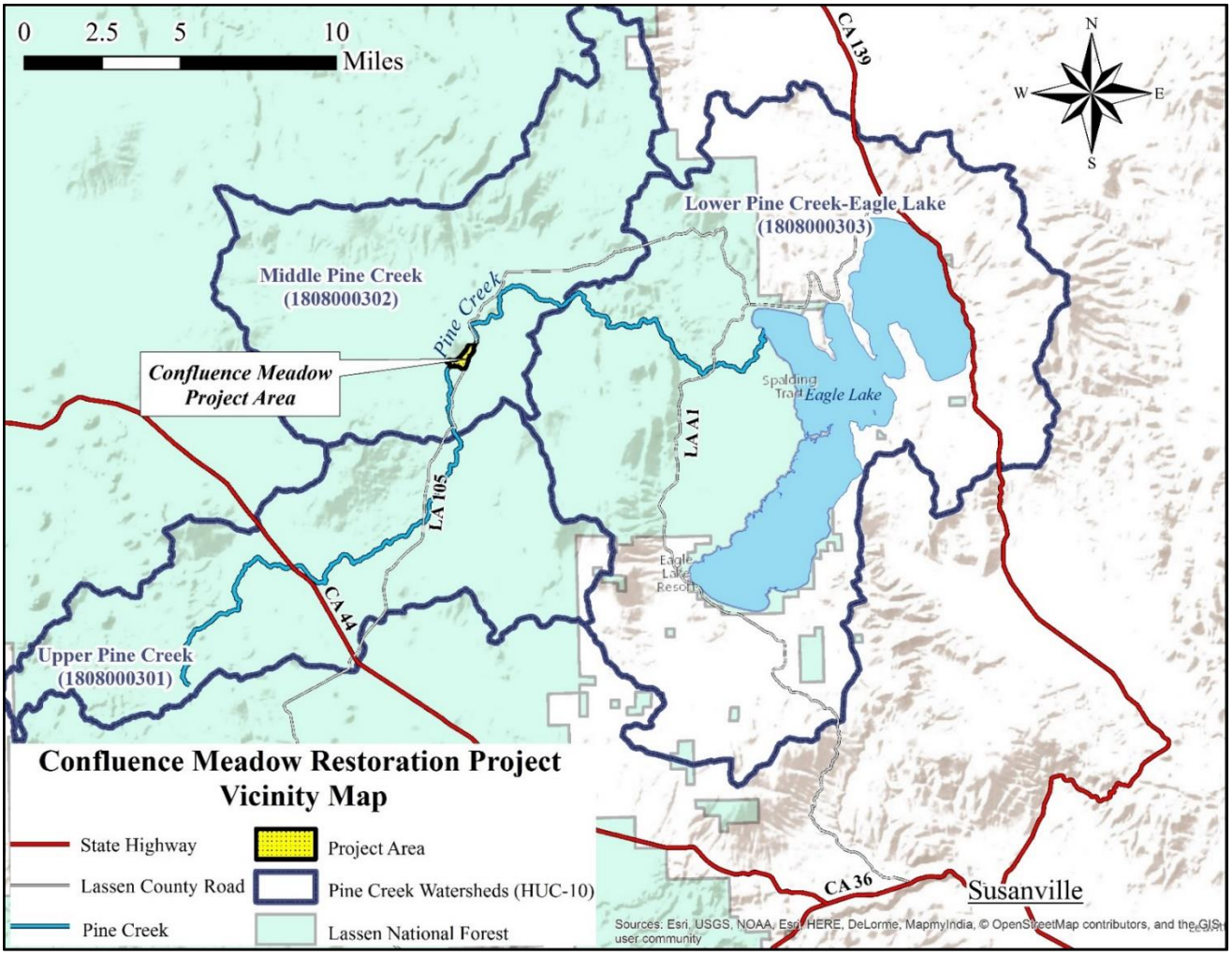

Figure 1. Vicinity map of project area

Background

Degraded habitat conditions, along with historic commercial fishing and poaching, led to a drastic decline in the population of ELRT by the 1930s. A fish trap and barrier were built in the 1950s near the lake on Pine Creek and ELRT began to be reared entirely in a fish hatchery to prevent possible extinction. Although a very successful hatchery operation is in place for ELRT, natural propagation of this subspecies is not occurring. Suitable spawning habitat is available in the upper reaches, but because of deteriorated conditions along the migration route, successful ELRT spawning would be limited to wet years with prolonged higher flows (Pustejovsky 2007).

Efforts to restore natural spawning started in the late 1990s with improvements to aquatic passage. Although most fish passage concerns have been addressed by collaborative restoration efforts in the

past two decades, there is still a need to improve watershed function to enhance the aquatic and riparian habitat along many reaches of Pine Creek.

Recently, the publication of the *Conservation Agreement for the Eagle Lake Rainbow Trout (*California Department of Fish and Wildlife Northern Region 2015*)* and new state funding initiatives, including California Proposition 1, Water Bond (Assembly Bill 1471), have intensified restoration efforts in the watershed, with a focus on improving stream flows and spawning conditions to increase chances of successful reestablishment of a wild population of ELRT. In 2012, the CRMP expanded and developed new partnerships to increase the organizational capacity for watershed improvement programs and wildlife and fish habitat improvement. Current work on the spawning run indicates that extending duration of flows may help reestablish natural reproduction.

Consequently, Pine Creek was evaluated for potential opportunities to restore degraded meadows. Meadows are important as they help moderate peak flows, increase flow duration, recharge ground water supplies, and provide aquatic habitat. Between 2014 and 2015 American Rivers Inc., a nonprofit collaborative member of the CRMP, used the *Meadow Condition Scorecard* (American Rivers 2012) to assess and prioritize meadows from a grant funded by the National Fish and Wildlife Foundation (NFWF). The Condition Scorecard is a rapid assessment tool that utilizes seven qualitatively measured indicators, including geomorphologic and vegetative characteristics within both the channel and meadow. The assessment effort identified Confluence Meadow as a top candidate for restoration action (Table 1). Incision is the largest impact, as well as poor scores for gullies, bank stability, and the presence of headcuts. Restoration actions that raise the channel bed and re-water the meadow floodplain have been a successful approach to meet both watershed and fish migration goals for incised channels.

Main Channel	Bank Height	Gullies/ Ditches	Bank Stability	Vegetation	Bare Ground	Encroachment	Number of Headcuts
Confluence	1	2	2	3	3	3	1
Other Pine Creek Meadows	3	2.7	3.4	3.5	3.3	3	0.3

Table 1. Condition score for each meadow and the number of headcuts. The scores apply to the meadow area as shown in report map and methods. Note the color axis for the headcut column differs from the colors for the condition scores. (1 =heavily impacted, 2 =moderately impacted, 3 =slightly impacted, and 4 =natural condition). Source (Hunt et al., 2015)

Purpose and Need

The purpose and need and proposed actions presented here were developed from professional input of the ELRD and LNF specialists and staff, *Pine Creek Meadow Assessment* (Hunt et al., 2015), Confluence Meadow Restoration Design Report (2017), *Pine Creek Geomorphic Assessment and Trend Analysis* (River Run Consulting and Todd Sloat Biological Consulting, Inc., 2015), *Pine Creek Watershed: Prioritization of Meadow Restoration Opportunities* (Todd Sloat Biological Consulting, Inc. and River Run Consulting, 2015), LiDAR data, and collaborative meetings with the Pine Creek CRMP. Two objectives were identified for the Confluence project:

Objectives:

1. Improve the meadow function and increase duration of flows by reconnecting the portion of Pine Creek flowing through Confluence meadow with the historic floodplain;
2. Manage cattle grazing within the Confluence project area using a combination of rest, timing, duration, and cattle numbers to allow sod forming sedges and other plants to establish.

The Confluence project objectives are consistent with goals and strategies for water and riparian management direction in the LRMP as amended by the Sierra Nevada Plan Amendment (SNFPA). The SNFPA management intent for aquatic, riparian, and meadow ecosystems include:

- maintain and restore the hydrologic connectivity of streams, meadows, wetlands and other special aquatic features by identifying roads and trails that intercept, divert, or disrupt natural surface and subsurface water flow paths,
- maintain and restore spatial and temporal connectivity for aquatic and riparian species within and between watersheds to provide physically, chemically, and biologically unobstructed movement for their survival, migration, and reproduction,
- maintain and restore the physical structure and condition of stream banks and shorelines to minimize erosion and sustain desired habitat diversity, and
- maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows, wetlands, and other special aquatic features.

Management direction for the LNF LRMP includes the following:

- Improve riparian conditions along Pine Creek. Consider fencing, grazing management and improvement projects (4-130).
- Emphasize watershed restoration and improvement and fish habitat management practices in riparian/fish prescription areas (4-50).

The objectives are also aligned with both the Region 5 Ecological Restoration Leadership Intent (USDA FS, 2011) to restore at least 50% of accessible, degraded forest meadows to improve habitat function and ability to hold water longer into the summer and deliver clean water. Reconnecting incised channels to the floodplain to distribute flood flows was also identified as a high priority in Goal 2, Objective 2.2 of the Eagle Lake Rainbow Trout Conservation Strategy to provide suitable stream/riparian habitat conditions for ELRT in the Pine Creek watershed.

Objective 1: Improve the meadow function and increase duration of flows by reconnecting the portion of Pine Creek flowing through Confluence meadow with its historic floodplain.

Existing Condition: Pine Creek and Little Harvey Creek join in the southwestern portion of a meadow system referred to as Confluence Meadow. Both creeks were channelized in the upper, southern portion

of the meadow. The channelization combined with other disturbances caused Pine Creek to incise into the meadow creating an entrenched stream channel. Historically, Pine Creek was a multi-threaded channel system, flowing in a western and eastern flow path in Confluence Meadow. The western flow path consists of a diverse network of small channels with regular, in-channel deep pools. The eastern flow path is incised and widened, with small historic remnant channels present in some locations. The base elevation of the eastern flow path is significantly lower than the pre-disturbance elevation; this reduces the overall functionality of the stream and the adjacent floodplain. With a lower stream channel elevation, the meadow drains more quickly, dropping the water table, and limiting the degree to which flood flows access the meadow area to rehydrate the alluvium. The functional floodplain has reduced in size and extent due to the lower base elevation, with wet and mesic perennial grasses, sedges, rushes, and forbs confined to the stream channel and replaced by annual grasses and sagebrush in the former floodplain.

Desired Condition: A functioning meadow with a stream channel that allows flood flows to access the floodplain and provides suitable migration habitat for ELRT. An associated meadow plant community that is dominated by wetland forb and graminoid species across the entire floodplain. A diverse suite of aquatic habitat for fish and other organisms, and adapted to mesic meadow conditions. Stable vegetated stream channels that reduce erosion and sediment while providing cover during fish passage. A system that can moderate flood flows, reduce flow velocity, and dissipate energy to prevent excessive erosion and channel instability, with dynamic flow paths that can adjust to landscape stressors and changing climate conditions.

Need for Change: There is a need to implement restoration treatments that would increase the base elevation of the existing Pine Creek channel reconnecting it to its historic floodplain to improve meadow function and extend flow duration to support the reestablishment of natural spawning population of ELRT in Pine Creek.

Objective 2: Manage cattle grazing within the Confluence project area using a combination of rest, timing, duration, and cattle numbers to allow sod forming sedges and other plants to establish.

Existing Condition: The Confluence project area is primarily located in the Harvey allotment with a small area near the valley constriction point located within the Champs Flat allotment. The Harvey allotment boundary is fenced but needs maintenance to control drift from the Champs Flat allotment. In 1994, a narrow exclusionary fence was constructed closely following the incised eastern flow path as one of the original Pine Creek CRMP projects. This fence resulted in improved aquatic and vegetative conditions within the entrenched Pine Creek channel, but the remaining area is exposed to grazing pressures. In the project area, a rotational grazing strategy is used in the Harvey allotment while the area in the Champs Flat allotment has no grazing. However, past management has not been consistent with the prescribed grazing strategies due to the existing fences and range management strategies.

Desired Condition: Manage the project area as one pasture, incorporating riparian-focused management objectives to accomplish and allow recovery or integrate periods of rest into the overall grazing management. Fence locations that enable control of duration, timing, livestock distribution, intensity of use, and allow recovery from disturbance. A pasture managed using effective practices that prevent repeated or excess damage to streambanks, soil, and plants.

Need for Change: Apply livestock management strategies that provide sufficient opportunity for plants to establish and grow. Incorporate riparian-focused management throughout the project area using grazing practices that control intensity, timing, and length of the grazing period.

Alternatives

Alternative 1: Proposed Action

This alternative would fill the incised channel and reconnect Pine Creek with the historic floodplain though Confluence Meadow. Information from the *Confluence Meadow Restoration Design Report* (Todd Sloat Biological Consulting, Inc., Waterways Consulting, Inc., and Kiesse, 2017, hereafter referred to as the "Design Report") was used to develop the proposed action and is hereby incorporated by reference. The Design Report describes the restoration proposal and specific methods in detail. The following sections provide a summary.

Meadow Restoration

In order to restore hydrologic conditions in Confluence Meadow, Pine Creek would be reconnected to its historic floodplain. This would involve filling approximately 1.2 miles of the existing, entrenched channel of Pine Creek and 0.37 miles of Little Harvey Creek where it has been ditched. Stream flows would occupy historic remnant channels within the meadow and increase the base elevation of Pine Creek. Where Pine Creek enters Confluence meadow, the stream gradient flattens and the valley bottom spreads wide. If Pine Creek were not constrained in the existing narrow, entrenched channel, flow would spread out, reducing stream energy and erosive forces and improving habitat and hydrologic function of the meadow floodplain.

A phased approach would be used to first implement the restoration activities and allow the area to revegetate, and second to allow Pine Creek to adjust and evolve through time in both the western and eastern flow paths. An existing network of historic remnant channels provide continuous flow paths across the floodplain, minimizing the need to construct new channels.

Fill Areas

The incised channels of Pine Creek and Little Harvey Creek ditch would be filled using nearby earthen material borrowed from higher elevation terraces located within the project area, shown as borrow areas 1 through 13 in Figure 2. If necessary, additional fill would be purchased and imported from a local commercial site on non-Forest Service lands. Approximately 69,000 cubic yards of fill material would be needed. Prior to filling the channel, an excavator would salvage all sod and topsoil from within the

channel and the terrace areas used for borrow. This material would be placed adjacent to the channel or terraces and the sod would be watered to keep vegetation alive, prior to transplanting. Before revegetating the filled channel and borrow terraces, these areas would be disced or ripped to a depth no greater than one foot, if needed.

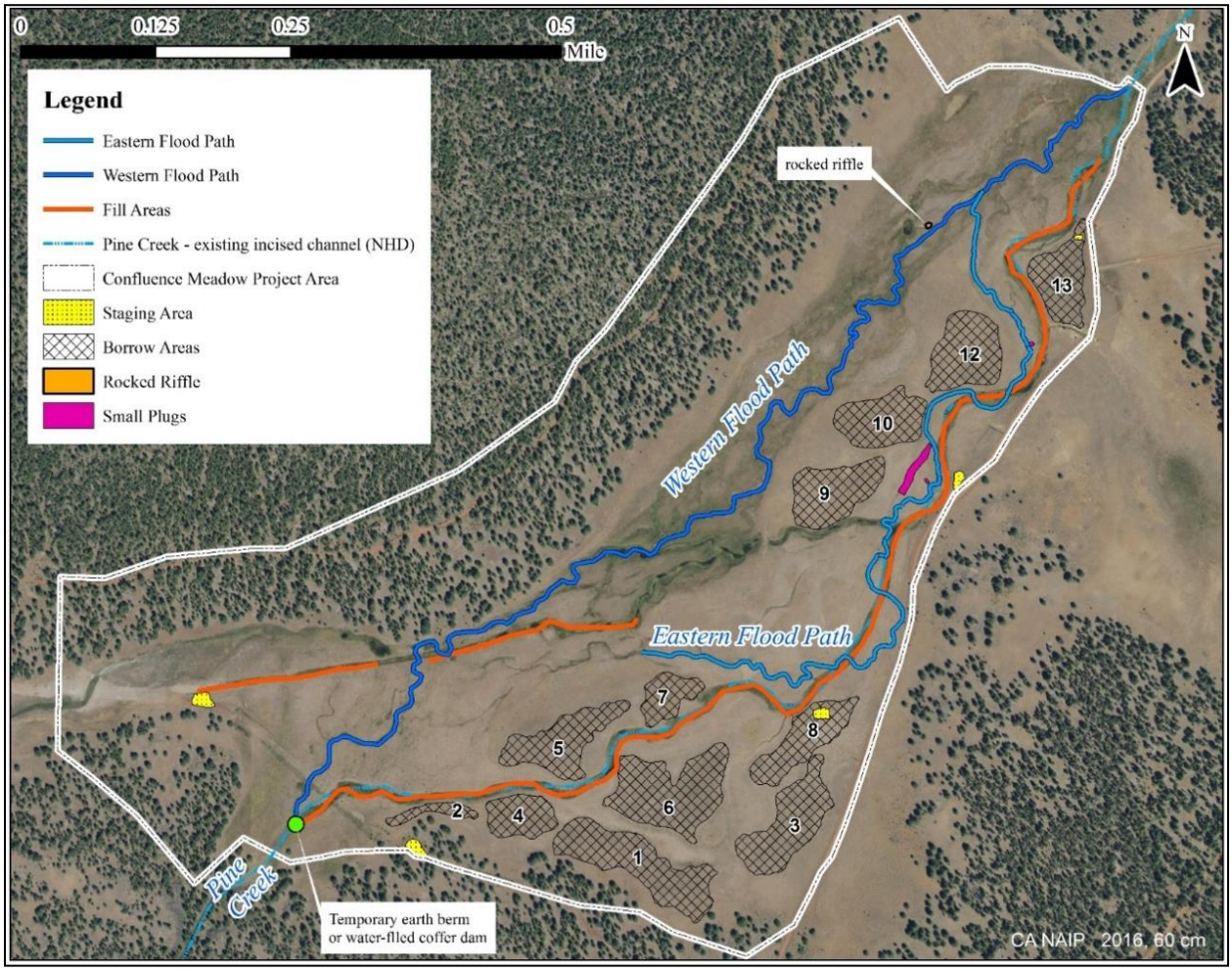

Figure 2. Overview of Proposed Meadow Restoration Action

Western Flood Path

Once the existing channel of Pine Creek has been filled, flows would be redirected into a remnant channel within the western flood path. Based on surveys and cross sections collected from LiDAR data, there is good continuity of grade control along this flow path. This continuity would result in flood flows accessing the floodplain and other channels in a consistent manner, so that water within the floodplain can enter and exit the channel at similar elevational differences, preventing potential new incision and knickpoints during high flows. Two reaches within the western flood path, referred to as Reach A and Reach B in the Design Report, have riffle elevations that lack continuity with the floodplain and would be treated. In these reaches, riffles would be hardened using rock with set elevations at similar distances between their crest and floodplain as other riffles in these areas.

A temporary earthen berm or water filled coffer dam would be constructed so that water is directed down the western floodway of the new proposed channel of Pine Creek. This berm would regulate the amount of flow entering the eastern floodway to protect the proposed fill areas from flooding and potential erosion, before vegetation is established. The berm/barrier would be removed once the area along the filled channel and re-contoured surface flow paths in the eastern floodway has become vegetated, approximately two-to-four years after implementation.

Eastern Flood Path

There is a remnant channel located atop the historic floodplain within the eastern flood path. This remnant channel would be maintained, with some additional channel created of similar size and capacity to the existing remnant channel to create a continuous flow path. This proposed flow path crosses the existing channel at three locations. In these areas, a broad flat swale would be created across the filled channel and low berms would be constructed to restrict flow from following the filled, existing channel of Pine Creek. Salvaged sod from the entrenched channel would be used to create this swale. The sod would be placed and watered on two or three occasions, if construction occurs during the growing season so that roots can become established and to keep the sod alive, before it goes dormant.

Small Plugs and Rock Riffle

Several small areas within the project require special attention to prevent erosion. A small earthen plug is proposed near the eastern low flow channel alignment. This plug would reduce the risk of flows from this channel eroding the newly filled areas of the existing entrenched Pine Creek. The second area is near the stock pond in the western floodway, where a rock riffle would be placed. Water flowing out of the pond has incised a channel feature that flows into the proposed western low flow alignment. Rock averaging one foot in diameter would be imported to aggrade a riffle, stabilize the channel, and keep it from further eroding. Finally, irregular edges along the filled areas would be created so that flood flows do not concentrate at the seam of new filled areas and adjacent floodplain. These would consist of small earthen or sod barbs of approximately eight inches in height and two-to-three feet wide that would redirect concentrated flow paths away from the seam of the fill area and floodplain, leaving backwatered areas between the barbs.

Meadow Revegetation

Revegetation of disturbed areas is an important component of the restoration design, particularly in areas receiving future flood flows. Flow has the potential to erode the filled channel. Establishing the previously described eastern flood path would be the primary feature to minimize this potential effect, as it would ensure flood flows concentrate within this channel rather than on the newly filled areas. The extent of riparian vegetation would increase following restoration activities and vegetative communities would evolve to a community representing the changed hydrology.

A combination of passive and active revegetation would be used to ensure that meadow communities recover in response to a changing physical template (hydrologic base elevation). Passive revegetation would occur when the surrounding plant sources expand and recolonize the newly created or reformed surfaces through seeds and tillers. Active revegetation involves planting seeds, plugs, and plants in areas that need high plant density within the first year in order to accelerate revegetation since passive revegetation can take longer to successfully establish. The salvaged topsoil and sod from the newly filled channel and terraces would provide a combination of upland, mesic, and hydric vegetation and a mix from both sources would be used where transplanting would occur.

Revegetation of the newly filled channels would consist of spreading salvaged topsoil upon filled areas, transplanting salvaged sod, and purchased sod plugs. The new elevation for the lowered terraces would be slightly above the floodplain elevation and have high shallow groundwater levels, promoting the establishment of more mesic vegetation compared to existing vegetation. Therefore, revegetation of lowered terrace areas consists of two approaches, one for areas near floodplain elevations, and the second for transitional-slope areas. First, the salvaged topsoil and sod would be transplanted onto the shaved terraces. Transitional-slope areas would also receive this topsoil, but additional native seed, plugs, and potted plants would be planted that mimic similar species and cover as existing areas that are not disturbed. Additional plantings would occur if monitoring indicates that vegetation is not successfully establishing. A revegetation plan has been developed detailing these actions (Appendix A).

Meadow Protection/Grazing Management

Following restoration activities, sufficient rest would be needed to allow plants to establish and grow. The project area is located in two active allotments but would be managed as one pasture, incorporating riparian focused management to accomplish objectives (Figure 3). The 1.7 miles of interior fence and the east end fence for the existing exclosure around the incised channel would be removed. Approximately 1.9 miles of new fences would be constructed by project collaborators on the south, west, and northwest ends of the project area and tied into existing boundary fences.

Fences would then be repaired and maintained as needed by term grazing permit holders. Timing, duration, and intensity of grazing would be more effectively controlled in an enclosed pasture than in large pastures, providing an easier way to make grazing compatible with riparian objectives. In addition, the new fence location would enable control to allow sufficient rest and recovery.

Livestock use would not be permitted within the restoration area until vegetative communities have successfully established on the filled channel and shaved terraces. Revegetation communities would vary according to soil types, topography, and depth to ground water. Revegetation would be considered successful when vegetation within the disturbed areas supports non-noxious plants that are similar in plant density and cover to those growing on adjacent lands undisturbed by the proposed project activities. In general in areas with wet-to-mesic hydrologic conditions aerial cover for perennial forbs

and graminoid species would be greater than 65%. In areas that are mesic-to-dry, aerial cover would be greater than 50%.

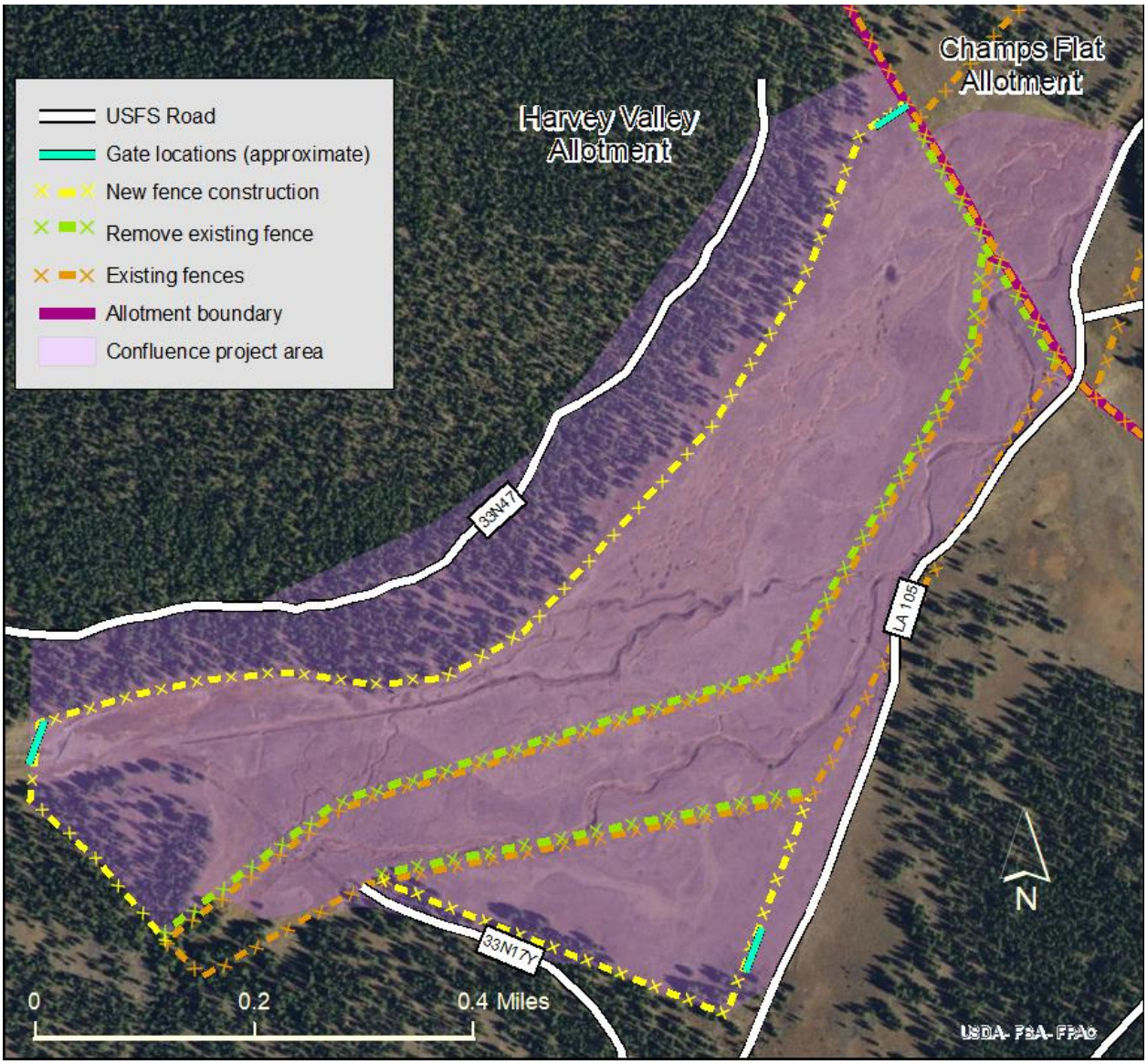

Figure 3. Overview of existing and proposed fences for meadow protection and grazing management.

Integrated Design Features

The following Integrated Design Features (IDFs) are resource protection measures that have been developed by specialists and incorporated as part of the proposed action for this project. They are in addition to National Core Best Management Practices For Water Quality (2012) and Standards and Guidelines from the Lassen LRMP, as amended.

Cultural Resources

1. All historic properties within the area of potential effects shall be clearly delineated prior to implementing any associated activities that have the potential to affect historic properties. Regional Programmatic Agreement (RPA) Appendix E section 1.3(1)(2)

    a. Historic property boundaries shall be delineated with coded flagging and/or other effective marking.
    b. Historic property location and boundary marking information shall be conveyed to appropriate Forest Service administrators or employees responsible for project implementation so that pertinent information can be incorporated into planning and implementation documents, contracts, and permits (e.g., clauses or stipulations in permits or contracts as needed).
2. Proposed undertakings shall avoid historic properties. Avoidance means that no activities associated with undertakings that may affect historic properties, unless specifically identified in this RPA, shall occur within historic property boundaries, including any defined buffer zones. Portions of undertakings may need to be modified, redesigned, or eliminated to properly avoid historic properties. RPA Appendix E section 1.1
3. Monitoring by heritage program specialists during project implementation would be used to enhance the effectiveness of protection measures. The results of any monitoring inspections shall be documented in cultural resources reports and the Infra database. RPA Appendix E section 1.5.

Invasive Plants

4. All off-road equipment would be weed-free prior to entering the Forest. Staging of equipment would be done in weed-free areas.
5. Known invasive plant infestations would be identified, flagged where possible, and mapped for this project. Identified invasive plant sites within or adjacent to the project area containing isolated patches with small plant numbers would be treated (hand pulled or dug) prior to project implementation. Any larger or unpullable infestations would be avoided by equipment to prevent spreading weeds within the project.
6. New small infestations identified during project implementation would be evaluated and treated according to the species present and project constraints and avoided by project activities. If larger infestations were identified after implementation, they would be isolated and avoided by equipment, or equipment used would be washed after leaving the infested area and before entering an uninfested area.
7. Post-project monitoring for implementation and effectiveness of weed treatments and control of new infestations would be conducted as soon as possible and for a period of two years after completion of the project.

8. If project implementation calls for mulches or fill, the source site would be surveyed beforehand and the material used only if it is determined to be weed-free. Seed mixes and container stock used for revegetation of disturbed sites would consist of locally adapted native plant materials to the extent practicable.

Range

9. Coordination between Project manager(s), Forest Range Specialists, and the affected grazing permittee(s) would occur prior to implementation of project activities to insure livestock would not be present in the project area during implementation.
10. Where or if necessary, new fence construction would occur prior to implementation of the meadow associated activities to protect disturbed sites from livestock impacts.
11. New fence construction would meet Forest Service design standards.
12. Monitoring to determine vegetative reestablishment at disturbed sites would include the grazing permittees when possible.

Riparian Conservation Areas and Water Quality Protection Measures

13. In-channel work would occur during the dry summer-early fall time period when streams have ceased flowing, as the work would take place in an intermittent reach of Pine Creek. However, if needed, any streams that do have flows would be diverted while work is taking place. Coffer dams, pipes, and pumps would be used to temporarily divert water around the site until work has been completed. Seep water would be pumped out and redistributed through a sprinkler system in a nearby appropriate area away from stream channels to prevent discharge of wastewater into creek. Diversions would be removed following completion of construction activities. Disturbed areas would be pre-wet, and during removal of the coffer dams, flows would be restored to the natural stream course gradually to minimize turbidity and prevent discharge of construction-related sediments.
14. Where diversion and dewatering are needed, native fish present would be captured and relocated to suitable perennial habitat in Pine Creek. These actions would be coordinated between the Forest Service and the California Department of Fish and Wildlife.
15. Equipment would cross stream channels when the streams are dry and at designated locations.
16. After work is completed, bare, recently-disturbed soils would be covered with coconut coir mats, weed-free straw or similar appropriate material to provide ground cover while vegetation is reestablishing.
17. Where fill is needed, fill that is either sourced locally from the shaved terraces or purchased and imported would be used as the base fill and top soil that was conserved during construction would be applied on top.

18. Appropriate permits would be obtained from the relevant regulatory state and federal agencies prior to implementation to prevent downstream impacts to water quality.
19. A qualified specialist will assess the soils during implementation to determine whether tillage is needed to aid revegetation efforts or ameliorate compaction.

Threatened, Endangered, and Sensitive (TES) Plant Species

20. New occurrences of TES plant species discovered before or during ground-disturbing activities would be protected through flag-and-avoid methods.

Threatened, Endangered, and Sensitive (TES) Wildlife

21. Gray wolf limited operating period: Maintain a limited operating period (LOP) prohibiting implementation activities from March 1 through August 15 within 1 mile of wolf activity indicative of a potential den location or a pup rendezvous site.

Alternative 2: No Action

Under the No Action Alternative, no changes would be made to the Pine Creek channel in Confluence Meadow. The water table in the eastern portion of the meadow would remain lowered. In wet years, flooding from Little Harvey Valley would raise the water table along the western floodway and possibly maintain existing wet-meadow vegetation in this area. The Pine Creek channel would continue to widen and erode laterally, and poor-quality riparian habitat with little shade or cover would persist.

Public Involvement

The following list outlines the public involvement process for the Pine Creek Restoration Project:

- The project has been listed in the Lassen National Forest Schedule of Proposed Actions (SOPA) since December 18th, 2017.
- The project proposal was presented and discussed with the Pine Creek Coordinated Resources Management Group on January 27th, 2016; October 27th, 2016; and during a field tour to the site on May 31st, 2017.
- The project proposal was discussed with the range permittees from the area in May 2017.
- The project proposal was discussed with the Lahontan Water Quality Control Board and California Department of Fish and Wildlife in May 2017.
- Susanville Indian Rancheria, the Pit River Tribe, Greenville Rancheria and Maidu Summit Consortium and Conservancy were consulted at quarterly meetings and mailed a copy of the scoping document regarding this project.

Scoping

Scoping for this project was initiated on December 18th, 2017. Individuals and groups that expressed interest in response to the SOPA were mailed a copy of the scoping document for this project. One comment letter was received and reviewed by district staff. No issues were raised that required modifying the proposed action.

Decision to be made

The decision to be made is: 1) whether to implement the Proposed Action as described above, 2) whether to implement an alternative that better responds to the Purpose and Need, 3) whether the No Action alternative should be implemented. A decision on this project is expected in January 2020.

Environmental Consequences

This section describes the environmental impacts of the alternatives in relation to the potential for significant environmental effects, as described in 40 CFR 1508.27. The following documents are summarized in this EA and are available upon request and are hereby incorporated by reference into this assessment:

- Management Indicator Species Report, Confluence Project; Sloat, (MIS Report)
- Biological Evaluation for the Confluence Meadow Restoration Project; Sloat, (Terrestrial) and Purdy (Aquatic), (BE)
- Biological Evaluation and Assessment for R5 Forest Service Sensitive and Federally Listed Plant Species, Pine Creek Restoration Project; Bovee, (Botany BE/BA)
- Confluence Meadow Restoration Project, Range Report; Pasero, (Range Report)
- Migratory Bird Treaty Act Report; Sloat, (MBTA)
- Confluence Meadow Restoration Project, Hydrology Report; Sloat, (Hydrology Report)
- Cultural Resources Report, Confluence Meadow Restoration Project; Gudiño, (Cultural Report)

Further analysis and conclusions about the potential effects are available in the above reports and other supporting documentation located in the project record. The following sections are discussions of resources that have relevance to a determination of significance.

Hydrology and Soils

Alternative 1

The proposed restoration actions involve ground disturbing activities such as salvaging and replanting sod, acquiring fill material and filling channels. These activities have the potential to affect conditions in Confluence Meadow and subwatershed areas downstream of the project area for a stream distance of one mile. In addition, activities occurring upslope of the site for a distance of one mile are also considered. The hydrologic effects of the treatments are discussed in terms of stream flow, water

quality, and channel morphology as well as effects on riparian areas, wetlands, roads, and water bodies. Past activities include vegetation management, primarily in the form of timber harvest and grazing management on ELRD lands. Ongoing activities include grazing management, existing road infrastructure and related maintenance, and dispersed recreation. Forest health treatments are currently occurring upslope of the site. Foreseeable future activities include thinning, mastication, and fuels treatments and additional meadow restoration upslope and upstream of Confluence Meadow.

Direct and Indirect Effects

Expected geomorphic and hydrologic outcomes would include increased frequency of flood flows spilling onto the floodplain, increases in shallow ground water levels, reduced velocity of flows within the Pine Creek channel, and more stabilized streambanks. Current research has also shown that restoration of meadow floodplains can prolong stream flow (Hammersmark et al. 2008, Ohara, et al. 2013).

There would be no direct negative effects due to decreased flows during construction because streams would not be flowing when proposed restoration activities are to take place. However, restoration activities have the potential to effect water quality and increase erosion. The use of machinery within the wetland areas would create areas of temporary soil displacement and disturbance and could cause temporary impacts to water quality within the sites. Water quality impacts would be mitigated by scheduling construction when Pine Creek is dry and there is no surface water on the site. Following ground-disturbing activities, bare sloping surfaces, such as newly shaped floodplain areas would have a higher erosion hazard, until they become revegetated. These effects would be temporary and mitigated through revegetation and directing Pine Creek away from these areas until vegetation has established, as described above.

Direct effects to riparian areas and wetlands include the removal of riparian/wetland herbaceous vegetation along 8,383 feet of channel within Pine Creek and the ditched sections of Little Harvey Creek. This effect would be temporary, as the vegetation and topsoil would be salvaged and watered until replanted on top of the filled areas. Redirection of Pine Creek and Little Harvey Creek out of entrenched channels and into historic remnant channels would improve 7,195 feet of riparian habitat. In addition, 3,123 linear feet of secondary channel would be created and enhanced within the eastern floodway, and 27.2 acres of dry grassland and 13.5 acres of entrenched channel habitat would be converted to wet meadow. By fencing areas and resting the meadow, the project would allow for more vigorous plant growth along banks that would improve soil and bank stability.

In the long-term, the condition of the western and eastern floodways of Confluence Meadow is expected to improve. Increased riparian vegetation would improve instream and wetland habitat and reduce streambank and streambed erosion. Elevated groundwater would expand the area of wet meadow and increased near-surface groundwater storage is expected to prolong flow in early season.

Cumulative Effects

Cumulative effects are the direct and indirect effects that result from the proposed action or alternatives when added to other past, ongoing, and reasonable foreseeable future actions in the project subwatershed. The boundary used to determine cumulative effects was the Pine Creek subwatershed from one mile above the project reach to one mile below the project. Other management activities include grazing, several past watershed improvement activities, limited timber harvest, road and railroad construction. Because the watershed improvement treatments are small relative to the size of the subwatershed, and IDFs and BMPs would be implemented, activities proposed would not result in detrimental cumulative watershed effects.

Soil disturbance would occur where restoration activities are proposed over the short term. While temporary effects could cause minor amounts of sedimentation during the following period of spring runoff, overall long-term water quality would improve from reduced bank erosion from the degraded channel. It would be unlikely that the scope of this project would result in excessive sedimentation of Pine Creek, as the impacted area would be less than 0.1% of the total watershed area. The project would not generate enough sediment to diminish water quality or beneficial uses on the watershed scale. Additionally, the implementation of appropriate BMPs and IDFs would reduce sediment-related risks to water quality.

Alternative 2

Under this alternative, no actions would be taken to reconnect the Pine Creek channel to its historic floodplain for improved watershed and meadow function, and fences would remain as they are currently located. There would be no disturbance of proposed borrow areas, fill placed in the incised channel of Pine Creek, redirection of stream flows, or fence realignment. Current management practices, including road maintenance and fire suppression would continue.

Direct and Indirect Effects

There are no direct effects of this alternative. Only previously-identified past, ongoing, and future projects would take place within the subwatersheds. There would be no floodplain reconnection under this alternative, thus there would be no ground disturbing activities or the associated risk of short-term sedimentation and water quality impacts. There would be no long-term beneficial effects to hydrologic or soils resources associated with the meadow restoration. There would be no long-term improvement in soil moisture or vegetation cover in riparian areas. Areas identified in need of watershed improvement would continue to concentrate or impede hydrologic flow patterns and erosion and channel widening would continue.

Cumulative Effects

Adverse effects related to stream entrenchment would continue, such as degraded water quality due to sedimentation, as well as unstable and over-widened stream banks. Cumulatively, this alternative would have the adverse effect of trending the Pine Creek subwatershed toward continued degradation of bank stability and channel morphology, particularly for channels within Confluence Meadow. There would be

no long-term beneficial effects to hydrologic resources. The entrenched channel would continue to concentrate flow. Cumulative effects of no watershed improvements under this alternative would be no facilitated trends toward improving hydrologic flow paths, connectivity, or meadow functions to enhance the trend of the subwatershed towards improved water quality.

Management Indicator Species (MIS), Terrestrial and Aquatic

The Pacific tree frog (Pacific chorus frog) and aquatic macroinvertebrates are the MIS whose habitat would be either directly or indirectly affected by the Confluence Meadow Restoration Project.

The Pacific tree frog was selected as an MIS for wet meadow habitat in the Sierra Nevada. Analysis for this species focused on four habitat factors that affect wet meadows: (1) acres of wet meadow habitat, (2) acres with changes in California Wildlife Habitat Relationships (CWHR) herbaceous height classes, (3) acres with changes in CWHR herbaceous ground cover classes and (4) changes in meadow hydrology.

Aquatic macroinvertebrates were selected as an MIS for riverine and lacustrine habitat in the Sierra Nevada. Analysis for this indicator focused on three indicators: (1) flow, (2) sedimentation, and (3) water surface shade.

Alternative 1

Direct, Indirect and Cumulative Effects

Pacific chorus frog: The project area supports 104 acres of wet meadow habitat, including 13 acres of habitat within the Pine Creek channel that is degraded by channel instability, low morphological diversity, and sedimentation. These 13 acres would be lost when the channel is filled; however, by reconnecting Pine Creek to the floodplain, the project would create an additional 41 acres of wet meadow habitat. In addition, by raising the water table throughout the meadow, the project would benefit wet meadow vegetation. CWHR height class and cover are expected to increase. Floodplain reconnection would also restore natural flow paths, increase prevalence and duration of shallow-water habitats and improve meadow hydrology. The proposed fencing would also allow improve management of livestock grazing at the site.

The cumulative effects analysis for this and all alternatives is restricted to the project area. The project area was selected because there is a low probability of activities outside of this area that would result in effects on this habitat (e.g. wildfire, forest treatments, grazing). In addition, most activities would have a positive effect on this habitat if implemented following standards and guidelines (e.g. forest health treatments upslope of the project area would likely result in increased filtration and greater subsurface water flowing into the meadow). Within this analysis area, the primary actions that could represent cumulative effects are livestock grazing. Livestock grazing is present within two Allotments that cover the entire project area. Grazing follows LNF standard and guidelines, and while these activities can have

localized effects on small areas (< one acre) of habitat, the areas are generally grazed “lightly” to “moderate” within this habitat type.

Aquatic macroinvertebrates: The project would be implemented in the period when Pine Creek is dry, minimizing temporary impacts on aquatic macroinvertebrates. By filling the currently-entrenched channel of Pine Creek, the proposed action is expected to increase floodplain inundation and reduce flood-flow velocities in the channel. In addition, the change in shallow groundwater storage is expected to prolong summer base flow. The resulting channels would not have high-eroding banks (the main source of sedimentation in the project reach) and local sediment input would decrease. Riparian shade is rare along the western floodway (which currently approximates the desired condition). Therefore, although herbaceous vegetation height and cover would increase, there would be little change in riparian shade.

The cumulative effects analysis for this and all alternatives is restricted to the project area. Within this analysis area, the primary actions that could represent cumulative effects are livestock grazing. Livestock grazing is present within two Allotments that cover the entire project area. Grazing follows LNF standard and guidelines, and while these activities can have localized effects sedimentation and shade, the areas are generally grazed “lightly” to “moderate” within this habitat type.

Alternative 2

Direct, Indirect and Cumulative effects

Alternative 2 would continue long-term trends within the project area. The area of wet meadow and the height and cover of vegetation would not increase. Sediment would not be reduced. Alternative 2 would not lead to a change in the distribution across the Sierra Nevada for Pacific tree frog nor would it alter the existing trend in the analyzed habitats for macroinvertebrates.

Threatened, Endangered, and Sensitive Wildlife Species (TES), Terrestrial and Aquatic

Alternative 1

Because the project area is outside the range of the species, or due to the lack of suitable habitat in the project area, it is was determined that Alternative 1 would have no effect on the following Federally Listed threatened or endangered species or their critical habitat: gray wolf, northern spotted owl, willow flycatcher, valley elderberry beetle, Central Valley steelhead DPS, Central Valley chinook salmon ESU, Delta smelt, winter-run chinook salmon ESU, California red-legged frog, Sierra Nevada yellow-legged frog, Shasta crayfish, conservancy fairy shrimp, vernal pool fairy shrimp, and vernal pool tadpole shrimp.

Because the project area is outside the range of the species, or due to the lack of suitable habitat in the project area, it was determined that Alternative 1 would have no effect on the following Forest Service Sensitive species: Northern bald eagle, California wolverine, American marten, Pacific fisher, Sierra Nevada red fox, great gray owl, willow flycatcher, greater sandhill crane, yellow rail, northern goshawk, California spotted owl, Shasta hesperian snail, foothill yellow-legged frog, Cascade frog, northwestern pond turtle, California floater, Great Basin rams-horn, scalloped juga, topaz juga, montane peaclam, nugget pebblesnail, black juga, kneecap lanx, Goose Lake redband trout, hardhead, and Pacific lamprey.

TES species analyzed in detail for the Confluence Meadow Restoration Project were Eagle Lake rainbow trout, Pallid bat, Townsend's big-eared bat, Fringed myotis, and Western bumble bee. A summary of the analysis of effects of the project for these species is given below:

Direct, Indirect and Cumulative Effects

Eagle Lake rainbow trout: Pine Creek provides migration habitat for spawning ELRT. The potential direct effects to ELRT are negligible due to implementation of project integrated design features. The project would be implemented when Pine Creek is seasonally dry. There is potential for some short-term sedimentation impacts following channel fill in the eastern floodway; however Pine Creek will be directed away from this area until it is revegetated. In the longer term, bank erosion and local sediment delivery to Pine Creek would be reduced by Alternative 1. In addition, the project would increase the duration and extent of seasonal flooding and the height and cover of herbaceous riparian vegetation, increasing habitat area and quality, including greater aquatic macroinvertebrate productivity. Increased base flows have the potential to prolong the seasonal migratory period; however, the magnitude of flow augmentation is uncertain. Long-term cumulative effects include additional restoration planned upstream and continued grazing in the surrounding subwatershed. ELRT would benefit from the improved hydrology of Pine Creek and improved riparian vegetation adjacent to the stream channels. Implementation of Alternative 1 may affect individual ELRT but is not likely to result in a trend towards federal listing or loss of species viability.

Pallid bat, Fringed myotis, and Townsend's big-eared bat: The project would not affect roost habitat for these three species because trees with cavities, caves and talus are absent and would not be affected. Also, no direct effects would occur from project construction as this activity will occur during the day, when the bats are inactive. The primary indirect effect would be livestock grazing and vegetation disturbance during construction, which could decrease insect prey abundance. Both effects are expected to be minimal as bats forage over large areas and the area impacted during implementation is small and grazing is minimal in the project area. In the long term, vegetation changes and increased surface water will likely lead to greater abundance of insect prey. Cumulative

effects were analyzed within the entire meadow area, including areas outside the implementation footprint. Grazing has the potential to impact populations of prey for these three bat species. However, proposed fence alignments would improve grazing management and is expected to lead to greater abundance and diversity of prey species. The Confluence Meadow Restoration Project may affect individuals of pallid bats, fringed myotis and Townsend's big-eared bats, but are not likely to result in a trend towards federal listing or loss of species viability.

Western bumblebee: Potential direct effects include squashing bees, digging up and/or burying nest sites, and disturbance during construction. Direct short-term effects to habitat include a temporary decrease in flowering plants removed or disturbed during construction. These effects would be reduced by scheduling construction during the late summer/early fall, after the nesting season and when fewer plants are flowering in the areas to be disturbed. In addition, excavated vegetation and top soil would be transplanted to other areas in the meadow, reducing the direct effects to flowering plants. Long term increased groundwater levels in the meadow would expand the area of flowering plants associated with wet to moist soil conditions. The majority of flowering plants that occur in the uplands are found on the open slopes, outcrops, and sage flats, which would not be directly disturbed.

Although restoring the meadow floodplain hydrology will affect approximately 27-28 acres of sage habitat in the meadow, this area will be recolonized by mesic flowering species. There would be no net loss of foraging habitat, and abundant xeric habitat exists in undisturbed areas of the project and in adjacent uplands. Raised water tables would reduce rodent burrowing and potentially reduce nesting habitat for Western bumblebees in the project area. However, rodent burrows were abundant throughout the wildlife analysis area, so the loss of available rodent burrows in the meadow is not expected to limit this species near the project site.

Cumulative effects were analyzed within the meadow area, including areas outside of the implementation footprint. Grazing has the potential to impact foraging habitat; however, proposed fence alignments would improve grazing management and would improve foraging habitat for Western bumblebees. With the proposed integrated design features included, Alternative 1 may affect individual Western bumblebees but are not likely to result in a trend towards federal listing or loss of species viability.

Determination: Implementation of Alternative 1 may affect individuals of Eagle Lake rainbow trout, pallid bats, fringed myotis and Townsend's big-eared bats, and Western bumblebee, but are not likely to result in a trend towards federal listing or loss of species viability.

Alternative 2

Direct, Indirect and Cumulative Effects

Current trends would continue under Alternative 2. No fencing, habitat or hydrologic improvements would be implemented. Eagle Lake rainbow trout, Pallid bat, Fringed myotis,

Townsend's big-eared bat, and Western bumblebee would not benefit from this alternative. Analyses of direct, indirect, and cumulative effects indicated that this alternative would not change current population trends of these species.

Range

The area of analysis for effects on the rangeland resource and livestock grazing is the allotment boundaries. The Confluence Meadow Restoration project area encompasses very small acreages within each of the affected allotments. The Harvey Valley Allotment encompasses 33,072 acres, of which approximately 187 acres are part of the proposed Confluence Meadow Restoration Project. The Champs Flat Allotment encompasses 18,646 acres, where the remaining 13 acres of the project area occur. A majority of the project area is located within riparian pastures that have received little to no grazing over the past 20 years. The surrounding area in both allotments is grazed annually, typically from June through July.

Alternative 1

Direct, Indirect, and Cumulative Effects

The primary direct effect of the proposed action is the change in size of the fenced area. The current exclosure encompasses approximately 52 acres in the Harvey Valley allotment and 52 acres in Champs Flat. When the existing fences are removed to create the proposed riparian pasture, it will include both exclosures and total approximately 280 acres. The benefit of this change is the creation of a riparian pasture intended for future grazing under specific timing, duration, and utilization levels that would maintain the recovered stream channel and banks. Riparian pastures are preferable to corridor fences, such as the existing exclosure in Harvey Valley. Riparian pastures that are large enough allow for stream channel movement, provide space for livestock to graze without concentrating along the channel and banks, and reduce fence-line trailing through meadows. The proposed pasture also includes a large area of upland and areas away from proposed treatment areas.

Since the existing exclosures in both allotments are not currently available for grazing, the two to four years of rest proposed for recovery and revegetation of the stream channels would not negatively affect current livestock management. When vegetative cover and channel conditions reach recovery objectives, grazing within the pasture could provide an additional rotation opportunity that could provide rest in other riparian pastures along Pine Creek. If grazing were re-introduced, careful observation of livestock distribution, channel and bank conditions, and use levels would be necessary to insure the recovered areas are not negatively impacted. The rotation schedule would need to remain flexible. Additionally, permittees from both allotments would be given the opportunity to include the pasture in their rotation schedules, but during different grazing seasons. Improved meadow function would result in better vegetative cover and composition. Livestock would have better quality forage that, even at lower use levels, would be beneficial. Lower use levels would maintain or continue

improvement in vegetative conditions.

Cumulative effects from this project would arise in combination with other planned and potential future watershed restoration activities that also aim to improve the riparian and stream conditions along the length of Pine Creek. A meadow plant community that is dominated by wetland forb and graminoid species across the entire floodplain contributes to favorable rangeland diversity. It also provides flexibility in timing of grazing by extending the time when forage is palatable, so grazing strategies can be varied from year to year to avoid grazing during the same time every year and improve grazing management within the allotments.

Alternative 2

Direct, Indirect Effects and Cumulative Effects

There would be no direct effects to grazing management with the No Action alternative. Indirect effects would be the lost opportunity to improve stream conditions and meadow vegetation within a riparian pasture where livestock grazing could increase management flexibility in the surrounding allotments.

Migratory Bird Treaty Act (MBTA)

Alternative 1

Direct, Indirect Effects and Cumulative Effects

Changes to habitat as a result of the Confluence Project would primarily affect migratory bird species that utilize upland and wetland habitats. Negative effects to upland habitat will affect a limited number of migratory species including the Brewer's sparrow and sage sparrow. There are no effects to habitat or migratory species typically addressed (e.g. yellow warbler) in the Management Indicator Species (MIS) report for this project. Effects to select Threatened, Endangered and USFS Sensitive birds and their habitats have been analyzed in the Biological Evaluation/Assessment for the Confluence Project. Of the numerous species of Birds of Conservation Concern, none were specifically addressed in this project's Biological Evaluation because there were no Forest Service sensitive avian species affected by project activities. None of the remaining species would be negatively affected from meadow restoration actions. Rather, the expected improvements from restoration actions will positively improve habitat conditions for wetland avian species.

All of the design features, and grazing management actions, would help insure a diversity of wildlife habitats is retained and created within the Confluence Project area.

Alternative 2

Direct, Indirect Effects and Cumulative Effects

Under the No Action alternative, the current LRMP, as amended, would continue to guide management within the project area. No actions would be taken to reconnect Pine Creek channel to its historic

floodplain for improved watershed and meadow function, which would provide improved migratory bird habitat. Fences as they are currently located would remain on the landscape and existing effects from grazing are limited to small areas and do not contribute to substantial negative effects on migratory bird habitat. There would be no disturbance of proposed borrow areas, fill placed in the incised channel of Pine Creek, redirection of stream flows, or fence realignment. Other current management practices such as road maintenance and fire suppression would continue and do not result in negative effects on migratory bird habitat.

Threatened, Endangered, and Sensitive (TES) Plant Species

Alternative 1

Direct, Indirect Effects and Cumulative Effects

There are no known occurrences of any TES plant species within the project area. Therefore, there will be no direct, indirect, or cumulative effects from implementation of the Confluence Meadow Restoration Project on any TES plant species.

Determination: With implementation of project Integrated Design Features, the Confluence Meadow Restoration Project will have no effect to any Threatened, Endangered or Forest Service Sensitive plant species because there are no known occurrences for any of these species within the project area.

Alternative 2

Direct, Indirect Effects and Cumulative Effects

There are no known occurrences of any TES plant species within the project area. Therefore, there will be no direct, indirect, or cumulative effects from Alternative 2 on any TES plant species.

Cultural Resources

Cultural resources are defined as the physical remains of past human cultural activities on the landscape. These remains provide a record of human activity within the ecosystem and provide a context for resource managers to assess the existing condition of the environment. Cultural resources near the Confluence project are diverse and represent at least 5000 years of prehistory and history.

Three cultural resources were recorded within the Confluence Meadow Restoration Project area of potential affects (APE), which is the entire project area.

Alternative 1

Direct Effects

Ground-disturbing activities associated with this alternative have the potential to disturb or destroy cultural resources.

Two historic properties within the APE are near construction activities; however, they are not within any of the locations identified for staging, plugs, rocked riffle or borrow areas. The two historic

properties will be protected from potential adverse impacts using standard resource protection measures defined in the Regional Programmatic Agreement and Interim Protocol employed as integrated design features: (1) Historic property boundaries shall be delineated with coded flagging and/or other effective marking. (2) Historic property location and boundary marking information shall be incorporated into planning and implementation documents, contracts, and permits so that proposed undertakings shall avoid historic properties. Avoidance means that no activities that may affect historic properties shall occur within historic property boundaries, including any defined buffer zones. (3) An archaeologist will be present during the implementation of any activities that will result in a subsurface disturbance in the event an unanticipated discovery is made.

One site is located near a proposed fence that would be constructed for grazing management. The construction of the fence is a ground disturbing activity that could adversely impact a site. Also, a fence directly bordering a site could result in livestock trailing and adverse impacts within the site. In addition to flagging and avoiding the site (see 1 and 2, above), a buffer along fence lines will be placed on the site by the Heritage Program Manager to prevent cattle trails from forming within the site boundaries.

Indirect Effects

The construction of fences may result in a greater number of cattle passing through sites and may result in cattle trails and wallows. Post-project monitoring will be used to document any indirect effects to cultural resources and formulate the necessary steps needed to eliminate those effects.

Cumulative Effects

The cumulative effects analysis boundary for cultural resources is the APE. The geographic scope of the cumulative effects analysis boundary was selected because impacts to cultural resources accumulate at the specific location of cultural resources, irrespective of actions in surrounding areas. Archaeological sites are stationary resources, which are protected from all current and future activities that would adversely impact them until eligibility to the National Register of Historic Places has been determined. Because these sites are protected, no cumulative impacts are anticipated.

Determination*:* With standard protection measures employed for archaeological sites and features, there would be no adverse effects to cultural resources resulting from proposed treatments within the project area.

Alternative 2

Direct, Indirect Effects, and Cumulative Effects

No effects to any cultural resources would result from implementing this alternative. Cultural Resources would not be impacted by the current degraded state of Confluence Meadow.

Recreation and Visual Resources

Alternative 1

Direct, Indirect and Cumulative Effects

With the implementation of the standard safety procedures, there would be minimal effects (direct, indirect, or cumulative) to recreation or public safety under Alternative 1. Actions proposed would result in minimal effects (direct, indirect, or cumulative) to the visual resources, including the positive effect from the restoration of a more natural landscape.

Alternative 2

Direct, Indirect and Cumulative Effects

As no action would occur, there would be no effects (direct, indirect, or cumulative) to recreation or public safety. There would be no effects (direct, indirect, or cumulative) to the visual resources.

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Appendix A

Confluence Meadow Revegetation Plan

Purpose

A key step for the Confluence meadow restoration is ensuring that meadow plant communities recover in response to a changing physical environment. Post-implementation depth to groundwater, along with rate and timing of seasonal ground water drawdown, will influence the rate of vegetation recovery, as well as species composition, density and cover. Where vegetation was removed for Confluence meadow restoration activities, a combination of passive and active planting will be used to facilitate establishment of a new plant community adapted to restored hydrologic conditions. This plan incorporates upland erosion control, revegetation, maintenance, and ongoing monitoring for adaptive management.

Goals and Objectives

We have established short- and long-term restoration and revegetation goals. The short- and long-term restoration goals apply to all disturbance areas created during implementation: filled eastern flow path, shaved terraces used for borrow, and restored channels. Following final grading the short-term goal consists of topsoiling, installing erosion control devices, preparing seedbeds, and establishing plant cover (seeding or transplanting of native plants to establish permanent vegetation cover during late fall or early winter to take advantage of precipitation). The long-term restoration goal is to establish a permanent vegetation cover with similar species, densities, and composition of adjacent lands undisturbed by the Project within five years following project implementation. The long-term goal will be achieved through maintaining or adding new or existing erosion control devices, additional plantings, additional rest from livestock grazing, and implementing a monitoring program.

Stabilize soil

Erosion control devices will be strategically placed to limit or direct overland flow to protect erodible soils. Certified weed-free straw and fabrics would be used in localized areas and on bank slopes. Stockpiled topsoil-vegetation mixture from shaved terraces and the filled channel areas, will be spread over the terraces and filled channels after recontouring is completed. The topsoil and vegetation mixture will provide seeds, vegetative propagules, and soil microbiota to facilitate plant establishment.

Establishing vegetation cover

Where vegetation was removed and where new soil is imported and compacted for Confluence meadow restoration activities, a combination of passive and active planting will be used to facilitate

establishment of a new plant community. Passive revegetation can occur when plants from adjacent habitat colonize newly created or reformed surfaces through tillers, rhizomes or stolons, or as seeds from plants adjacent to disturbed ground disperse onto open ground and establish the next growing season. Passive revegetation is anticipated to be most successful in smaller disturbed patches, with larger disturbed areas requiring active restoration activities. Active planting will be used to accelerate plant density within the first three years and to ensure meadow plant community composition develops along the targeted trajectory. Revegetation methods consist of spreading salvaged topsoil upon filled channels and lowered terraces, transplanting salvaged sod, spreading seed and planting sod plugs and potted plants. Native plants or seeds may be collected or purchased from nurseries. It is anticipated that the upland species formerly present on terraces will not be suited to post-restoration hydrologic conditions. Where restoration activities have increased the hydroperiod relative to pre-restoration conditions, wetland obligate (OBL) and facultative wet (FACW) species will be used (Table 1).

The floodplain elevations around the lowered terraces and transitional slopes will be passively revegetated by spreading the salvaged topsoil and actively revegetated with sod plugs and a mixture of seeds. The high elevation areas on the cut terraces will be planted with sod plugs and potted shrubs. The species used are based on the existing dominant vegetation along moisture gradients within Confluence Meadow (Table 1). The recommended seeding rates (seeds/ft^2) or planting density will be used for initial revegetation efforts but may be adjusted where monitoring shows that revegetation is not meeting cover objectives.

The filled channel and if needed shaved terraces will be disked or ripped to a depth no greater than one foot. Salvaged topsoil will also be spread on the newly filled channel areas and left in a roughened condition to enhance soil water infiltration and seedling establishment. Salvaged sod will be transplanted and regularly spread onto the prepared seedbed with an estimated cover of 50%. The remaining open areas will be hand planted with purchased sod plugs and seed mixtures. Transplanted sod mats should be watered at least twice if construction occurs at a time of year when transplanted sod mats have not gone dormant.

Partners will submit orders during the preceding fall of meadow restoration activities to allow time for seed collection. All planting following restoration activities will occur from September 15th to December 15th after the hot dry season but before precipitation which will enhance seed germination.

Table 1. List of species by wetland status, elevational location to plant, plant structure used for revegetation, and method used to revegetate.

Species	Hydrologic Occurrence	Restoration location	Type	Method
Carex athrostachys	FACW	New floodplain and transitional slopes	Sod plug	20 ft spacing
Carex filifolia	FAC	Upland terrace	Sod plug	20 ft spacing
Hordeum brachyantherum	FACW	New floodplain and transitional slopes	Seed	Broadcast lbs/ft^2
Juncus balticus	OBL	New floodplain	Sod plug	20 ft spacing
Juncus nevadensis	FACW	New floodplain and transitional slopes	Sod plug	20 ft spacing

Muhlenbergia filiformis	FACW	Transitional slopes	Seed	Broadcast lbs/ft^2
Deschampsia cespitosa	FACW	Transitional slopes	Seed	Broadcast lbs/ft^2
Artemesia cana	FACW	Upland terrace	Potted	10 ft spacing

Monitoring and Maintenance

The primary monitoring objectives are to assess the effectiveness of temporary soil stabilization and passive revegetation and active seeding and transplanting efforts. Monitoring will occur early- to mid-summer annually for three years and biannually until deemed successful. Revegetation would be considered successful when aerial cover for perennial forbs and graminoid species is greater than 65% areal cover in wet-to-mesic areas and greater than 50% areal cover in mesic-to-dry areas with similar plant composition to those growing on adjacent lands undisturbed by the proposed project activities. Based on monitoring results, maintenance needs would be determined and additional remedial measures would be taken.

All disturbed areas will be walked to identify the presence of accelerated erosion or washouts. The restoration team will make recommendations and implements additional remedial work in those locations.

Vegetative sampling plots (1x1 meter in size) will be used to measure aerial cover of functional plant groups (annual forbs, perennial forbs, annual graminoids, perennial clumped graminoids, perennial rhizomatous graminoids), bare ground, and invasive species presence. Plots will be randomly stratified across the new elevations: new floodplain, transitional slopes, upland, and filled channel. Four plots will be established for each stratified elevation/location (16 plots total). Six plots be established in adjacent undisturbed areas with similar hydrology for comparison. Revegetation will generally be considered successful when vegetation within the disturbed areas are similar in forb and graminoid plant density and cover to those growing on adjacent lands undisturbed by the Project. Overview photos will be taken of each terrace, the filled channel and the restored channels for a qualitative, larger scale assessment.

Where initial revegetation and plant establishment efforts fail to make progress towards the cover success criteria (wet to mesic areas, 65% cover, mesic to dry areas, 50% cover) after year 3, reseeding and replanting will occur where necessary. The restoration team will be consulted with regards to any proposed changes in seeding mixes and application methods. If successful plant establishment is not achieved within 5 years, additional mitigation will be discussed and implemented.